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SPECIAL HANDLING

COPY 3 OF 7 COPIES

PROGRAM REVIEW

NRO REVIEW COMPLETED

SOARD AN/APQ 93 RADAR

NRO

Contract

STAT

30 December 1964

WESTINGHOUSE ELECTRIC CORPORATION

AEROSPACE DIVISION

Box 746, Baltimore, Md. 21203

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PERFORMANCE

ORIGINAL OBJECTIVES	PRESENT PERFORMANCE	PREDICTED PERFORMANCE
3 DEVELOPMENTAL MODELS	✓	✓
3.2 M, 90,000 FT	1.5 M, 45,000 FT	3.2 M, 90,000 FT
27 MILE STAND-OFF	13 MILE STAND-OFF	27 MILE STAND-OFF
20 MILE STRIP—9 INCH FILM	10 MILE STRIP—9 INCH FILM	20 MILE STRIP—9 INCH FILM
600 LBS AIRBORNE RADAR	932 LBS	✓
GROUND-BASED OPTICAL CORRELATOR	✓	✓
RESOLUTION: 10 FT X 10 FT	RESOLUTION: 8 FT X 23 FT (Az X RANGE)	RESOLUTION: 11 FT X 27 FT
SIGNAL / NOISE > 0 db	SIGNAL / NOISE 11.4 db	SIGNAL / NOISE -1.5 db
	[RESOLUTION WITH DETAIL CORRELATOR 4 FT X 23 FT]	[DETAIL CORRELATOR 4 FT X 27 FT]
		WITH CHIRP MODIFICATION; 10 MI. STRIP
		RESOLUTION: 11 X 11 FT
		[DETAIL CORRELATOR 4 FT X 11 FT]

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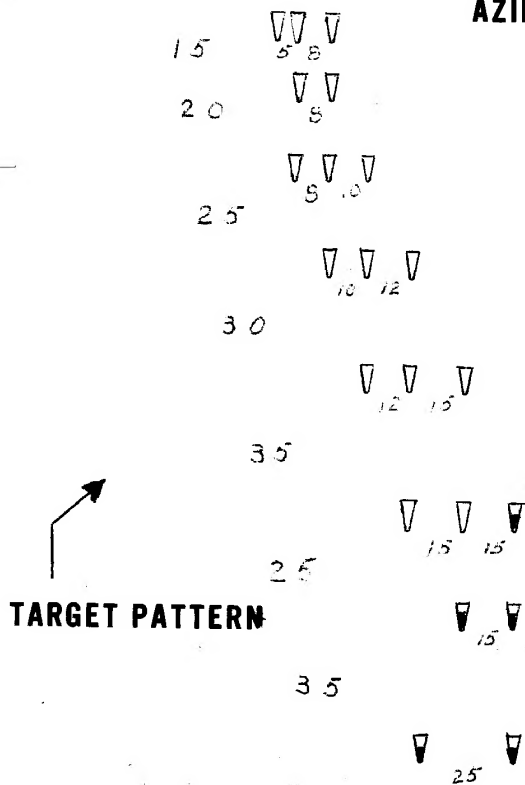
Replace with 4 missing illustrations

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TARGET RESOLUTION

DETAIL CORRELATOR IMAGE INDICATING
AZIMUTH RESOLUTION OF 4 FT.



RADAR IMAGE

FLIGHT S-123 DEC. 29 '64

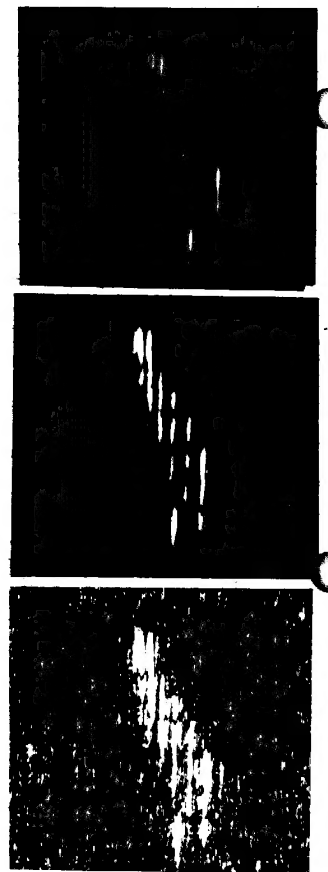
ALT. 20,000FT.

SPEED 550 KPH.

TARGET LEGEND

▽ ≡ 75.3 FT.²

▽ ≡ 365 FT.²



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COST REVIEW

SOARD AN/APQ-93 RADAR

ITEM	DESCRIPTION	STATUS	RECOMMENDATION	BUDGET COST ESTIMATE
1	DEVELOPMENT PROGRAM 3 RADAR SETS - 1 CORRELATOR	COMPLETE	_____	
2	MODIFICATION PROGRAM (SIG/NOISE AND RESOLUTION IMPROVEMENT) (ANTENNA REPAIR)	IN PROGRESS	COMPLETE MODS	
3	SPARES PROGRAMS	CURRENT	MAINTAIN	
4	GROUND SUPPORT EQUIPMENT	COMPLETE	_____	
5	FIOI FLIGHT TEST	AUTHORIZED TO APR. 15, 1965	} 4 PART FLIGHT EVALUATION PROGRAM TO JUNE 30, 1965	
6	PHASE II FLIGHT TEST	AUTHORIZED TO FEB 15, 1965		
7	CORRELATOR PROGRAM	ITEK CONTRACT TO DEC 31, 64		
8	DETAIL CORRELATOR	PROPOSAL SUBMITTED (J-0194-57; SEPT 30, 1964)		
9	RADAR INTERPRETATION	IN PROGRESS (J-0194-58 PARTS 1, 2 AND 5)	_____	
10	CORRELATOR MECHANICAL REVIEW	PROPOSAL	CONDUCT LIMITED REVIEW PROGRAM	
11	2ND A/C INSTALLATION	PROPOSAL	MODIFY ONE RADAR FOR CHIRP (PROVE RE- SOLUTION WITH DETAIL CORRELATOR	
12	ADVANCED TECHNIQUES	PROPOSAL		

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CONTINUATION OF PROGRAM EFFORT

SOARD AN APQ-93 RADAR

- Item 1 DEVELOPMENT PROGRAM -- to build 3 Radar Sets and 1 Correlator
Complete
- Item 2 MODIFICATION PROGRAM -- to improve resolution and signal/noise ratio
In Progress
- a Reduced Transmitter Pulse Width
 - 1) 30 Nano-second to 20 Nano-second
 - b. Addition of Low Noise Pre-Amplifier
 - 1) Replacing TWT amplifier with Parametric amplifier. System Signal/Noise improvement of 3.9 db.
- Item 3 SPARES PROGRAMS -- to provide spares for Flight Test Evaluation programs.
These programs are current and are being maintained.
- Item 4 GROUND SUPPORT EQUIPMENT
Complete

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- Item 5 F-101 FLIGHT TEST -- to accomplish, most efficiently, preliminary check of operation.
- a. Optimization, at minimum cost, of Radar and correlator before installation in final vehicle
 - b. Check of Ground Support Equipment and establishment of ground check-out procedures.
 - c. Provide data to check Radar mods.
 - d. Provide majority of data for Radar Interpretation Program over wide range of terrain.
- Item 6 PHASE II FLIGHT TEST -- to prove operation of Radar in design environment.
- a. Accomplish integration of Radar with:
 - 1) Aircraft
 - 2) INS Nav. Sys
 - b. Provide data for Radar Interpretation Program under full design conditions.
- Item 7 CORRELATOR PROGRAM to maintain and operate Optical Correlator.
- a. Provide correlation of data film from the two Flight Test programs

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- Item 8 DETAIL CORRELATOR -- to provide optimum correlation of limited target area; 1/2 - 1 mi.
- a For detail analysis of aircraft behavior.
 - b. Provide verification of proper radar adjustment and performance
 - c Verify performance of Ground Support Equipment and test patterns.
 - d For Radar Interpretation program -- as a tool for visually scrutinizing detail target complexes while varying controls; then photographing optimum result.
- Item 9 RADAR INTERPRETATION PROGRAM to derive maximum intelligence value from radar images.
- a. To serve as adjunct to optical camera surveillance
 - 1) Fill-in for cloud gaps in otherwise good optical photos
 - 2) During night, rain, snow, fog, haze
 - 3) Provide "stand-off" advantage
 - 4) Different sensor response for additional clues.
 - b Improve RI capability.
 - 1) Seek out targets of special military significance.
 - 2) Simultaneous recon camera photos for comparison.
 - 3) Attempt differentiation of materials; natural and structural

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- Item 10 CORRELATOR MECHANICAL REVIEW -- to provide greater consistency of operation at high levels of performance which have been achieved
- a. Investigate "Noise" light level in correlator which appears to be limiting min. signal detection.
 - b. Check back-lash and re-set-ability of all controls.
 - c. Check Tracking of input and output films.
 - d. Investigate sensitivity to vibration, power transients.
- Item 11 2nd A/C INSTALLATION -- to provide installation trusses, brackets and waveguide for another vehicle.
- a. Better opportunity for scheduling flights in final vehicle with 2 aircraft modified
 - b. Opportunity for 2 simultaneous installations permitting dual pre-flight check-out.
- Item 12 ADVANCED TECHNIQUES PROGRAM -- to incorporate chirp operation of transmitter
- a. Improve range resolution approx. three-fold giving "square" resolution element of about 11 ft. X 11 ft.
 - b. Average power for sets #2 and #3 can then be increased ten-fold to provide approx. +8 db Signal Noise ratio for design altitude.

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PROGRAM SCHEDULE

